Nov. 28, 1961 F. B. BAILEY 3,010,273

STOP MOTION FOR ROVING FRAME

Filed Nov. 25, 1958 3 Sheets-Sheet 1

Fig. 1.

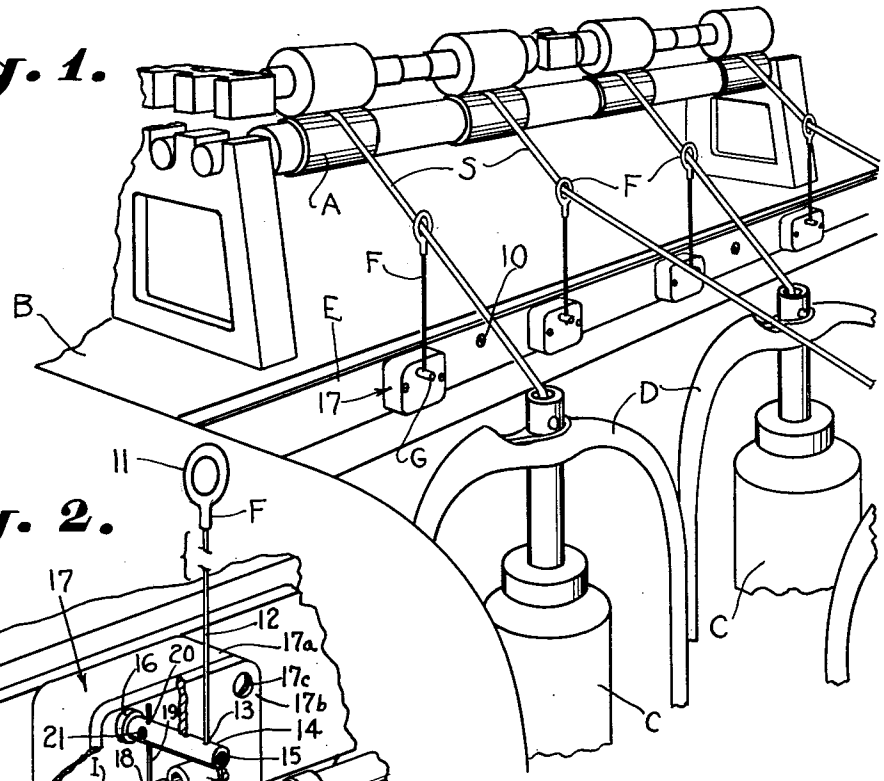
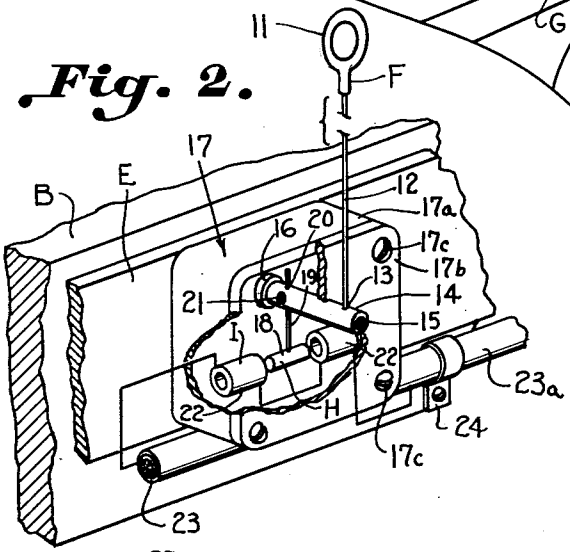
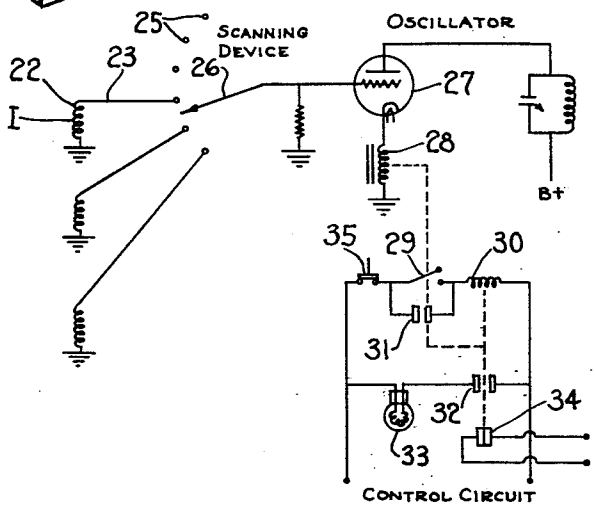


Fig. 2.





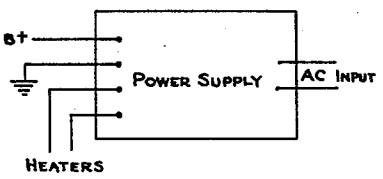


Fig. 3.

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Fig. 4.

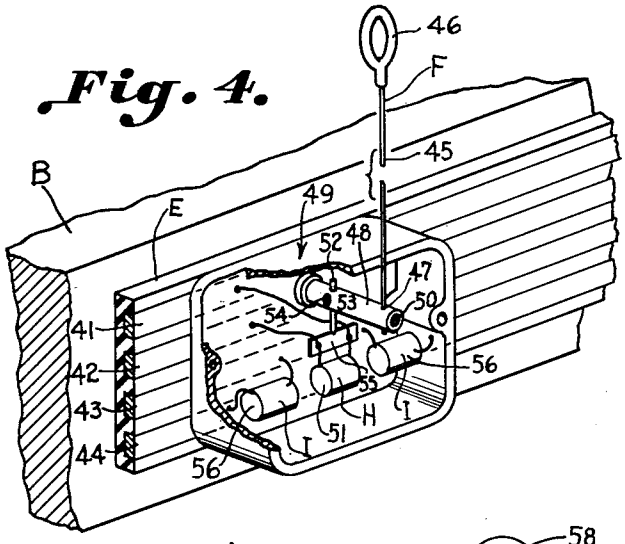


Fig. 5.

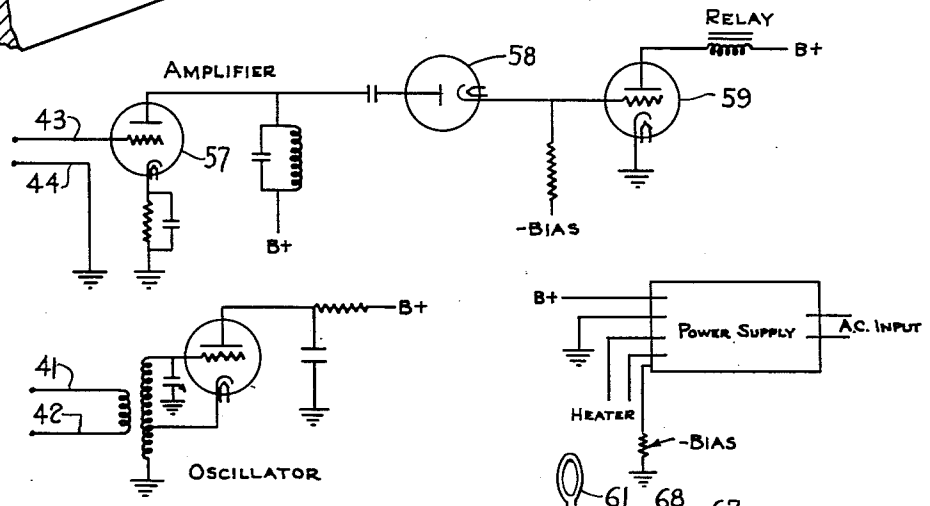
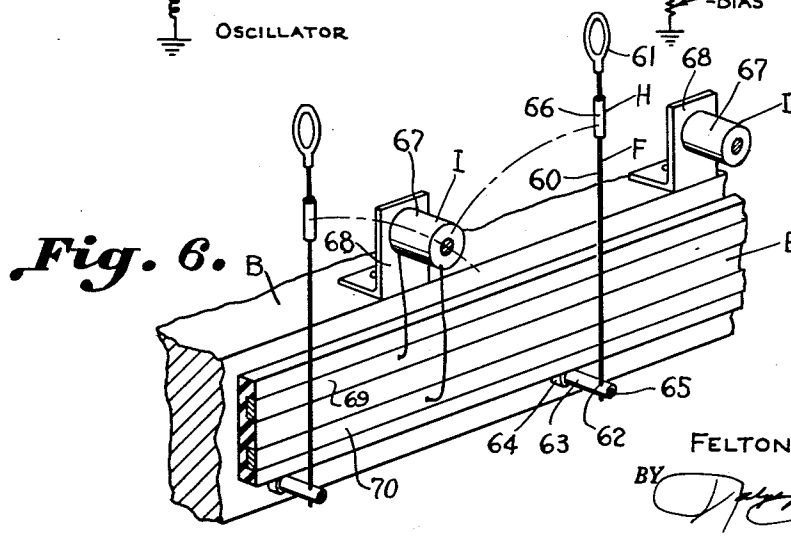


Fig. 6.



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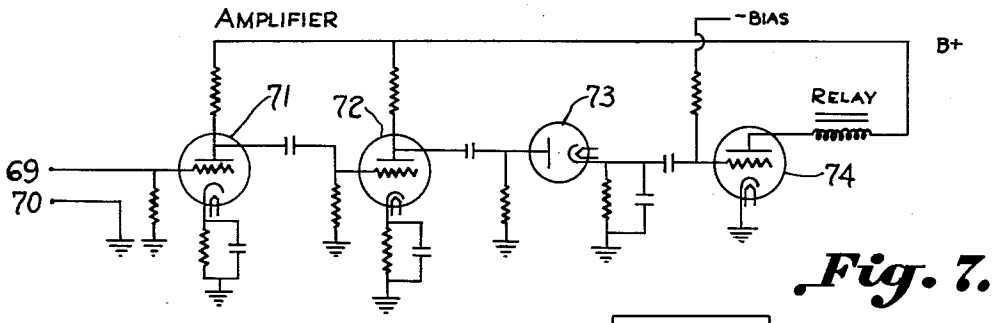
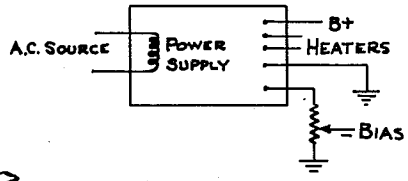


Fig. 7.



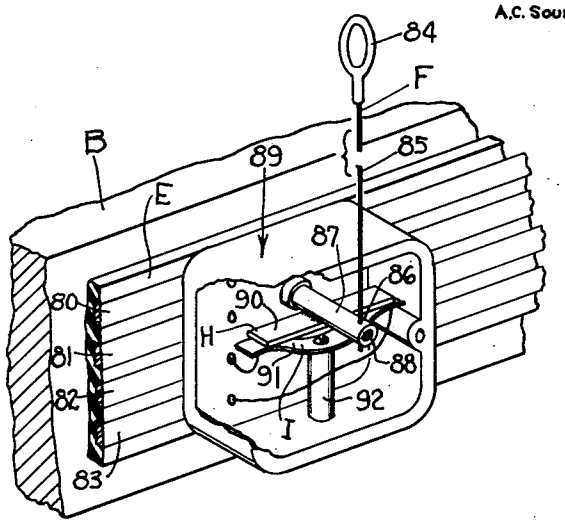


Fig. 8.

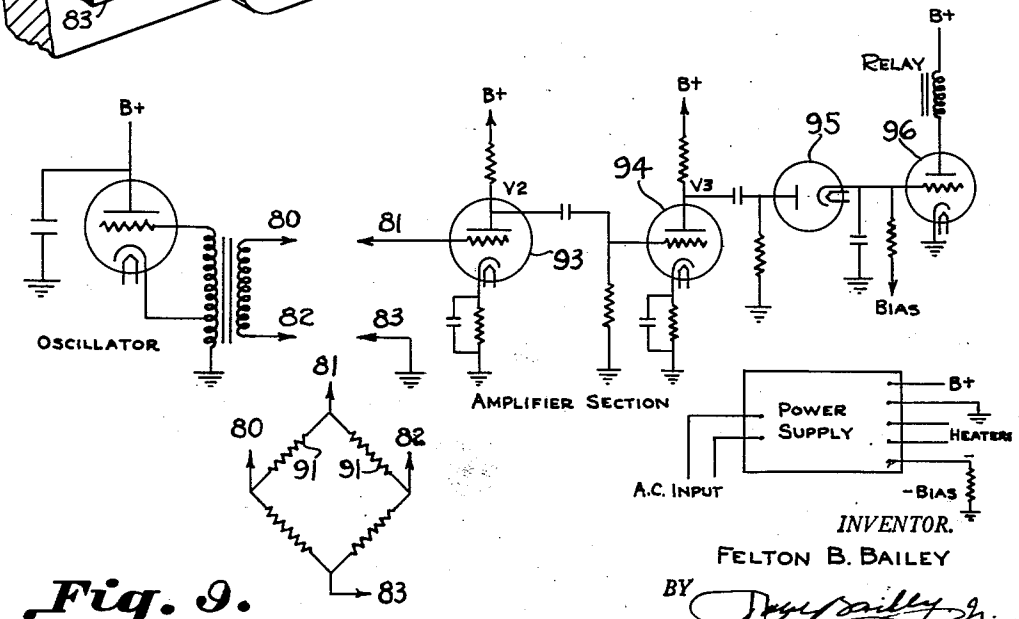


Fig. 9.

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3,010,273

STOP MOTION FOR ROVING FRAME

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Filed Nov. 25, 1958, Ser. No. 776,229
7 Claims. (Cl. 57—81)

This invention relates to stop motions and more especially to an improved stop motion for controlling the operation of textile machinery which handles delicate textile strands, when the strand breaks or becomes excessively slack.

This invention has particular application to roving frames and the like where delicate textile strands or rovings are fed from a drafting system on to bobbins by the operation of flyers and the like. It is desirable to stop such machinery when an end of roving comes down so as to prevent damage to the other rovings and to prevent the accumulation of waste. Stop motions of several types are currently on the market. One of these depends upon the action of a suction device to draw the broken end into a collection unit while the other device is an electrical stop motion dependent upon the operation of drop wires which pivot to one side or the other upon the occurrence of a faulty roving. In connection with stop motions of the latter type electrical contacts must be mechanically closed in order to close a circuit for actuating suitable means for shutting off the power to the roving frame and the like. While stop motions of this latter type operate successfully they are subject to disadvantages due to the necessity for mechanically closing the fixed contacts and movable contacts. After prolonged use the switch contacts often become corroded due to arcing so that an effective electrical connection is not always made.

Accordingly, it is an object of this invention to provide an improved controlling device for textile machinery operating upon delicate textile strands.

An important object of this invention is the provision of an improved electrical stop motion for roving frames and the like.

Another object of this invention is the provision of a stop motion for roving frames and the like of the type operated by pivoted drop wires in which improved switching means is provided for eliminating arcings of the contacts.

A further object of this invention is the provision of an electrical stop motion for a roving frame and the like which is operated by pivoted drop wires which vary the output of an electrical element and which utilizes a differential in output to operate electronic means shutting off power to the roving frame.

Some of the methods provided to carry out the invention will be hereinafter described.

The invention will be more readily understood from a reading of the following description and by reference to the accompanying drawings forming a part thereof wherein some illustrative examples of the invention are shown, and wherein:

FIGURE 1 is a perspective view of a roving frame showing a stop motion constructed in accordance with the present invention operably positioned thereon,

FIGURE 2 is an enlarged perspective view, with parts broken away, showing the details of one of the switches shown in FIGURE 1 and its associated parts,

FIGURE 3 is a circuit diagram showing the electrical connections and elements for operating the parts shown in FIGURES 1 and 2,

FIGURE 4 is an enlarged perspective view of a modified form of the invention with parts broken away,

FIGURE 5 is a circuit diagram showing the various

electrical connections and components for operating the device shown in FIGURE 4,

FIGURE 6 is an enlarged perspective view of another modified form of the invention,

FIGURE 7 is a circuit diagram showing the various electrical connections and components for operating in connection with the parts shown in FIGURE 6,

FIGURE 8 is an enlarged perspective view of still another modified form of the invention, and

FIGURE 9 is a circuit diagram showing the electrical connections and components for operating in connection with the parts shown in FIGURE 8.

Referring more particularly to the drawings, similar parts in connection with all of the modifications will be designated by like reference letters while different reference numerals will be used to designate the specific parts of th various modifications described below.

FIGURE 1 shows a plurality of textile strands or rovings S being fed from the drafting system A of a roving frame B and the like. The rovings S are shown being wound on bobbins C by the usual flyers D. A mounting strip E is carried by the roving frame B between the drafting system A and the flyers D so that a drop wire F may be operably positioned beneath each end of roving S. The drop wires F are of the type which pivot to one side or the other upon the occurrence of a faulty roving and parts moved by such movement of the drop wire are shown in FIGURES 2, 4, 6 and 8. The drop wires F are provided with pivotal mountings G. Means H having connection with the drop wires F are moved in response to movement of the drop wires F for varying the output of an electrical element I which is interposed in a suitable sensing circuit for actuating means for shutting off power to the roving frame.

Referring to FIGURES 1, 2 and 3 the stop motion device shown includes an electrical element I in the form of a coil the inductance of which is varied by means H in the form of a suitable metallic core which is moved with relation to the coil I by the drop wire F to effect such change in the output of the coil as must be used to actuate means for shutting off the power to the roving frame.

The mounting strip E is attached to the roving frame by spaced screws **10** and is so positioned that the roving S passes through the eye **11** of the drop wire F. The eye **11** is carried by a wire portion **12** which passes through a transverse bore **13** in a sleeve **14** and is fixed therein by a set screw **15** carried by the sleeve. The sleeve **14** is journaled within a bearing portion **16** formed within a casing broadly designated at **17**. A metallic core **18** depends from the sleeve **14** and is carried in a fixed relation thereto by the wire **19** which passes through a transverse bore **20** within the sleeve **14** and is fixed therein by the set screw **21**.

A pair of inductance coils **22** are positioned at opposite sides of the metallic core **18** and are in alignment therewith so that the metallic core **18** may be moved within either coil. It will be noted that the coils **22** are electrically connected and that the high potential side of the coils is connected to one of the insulated wires of a multi strand cable **23** while a low potential side of the coils **22** is grounded to the shielding **23***a* of the cable **23**. The cable **23** is shown secured to the roving frame beneath the strip E by suitable fastening means **24**. The casing **17** includes a base **17***a* and a cover **17***b*. Suitable fastening means in the form of screws **17***c* are provided to secure the cover **17***b* to the base **17***a* and to secure the entire casing **17** to the strip E. If desired separate fastening means may be provided to secure the casing to the strip E so that the cover may be removed without removing the entire casing. If desired the cable **23** can be

carried by the strip E rather than being directly mounted upon the roving frame.

In operation when a drop wire falls the metallic core 18 is moved into one of the coils 22 so as to vary the inductance thereof. Each of the strands forming the cable 23 is connected to one of the contacts 25 of a scanning device which is shown here as including a rotor 26. The rotor 26 is electrically connected to the control grid of a vacuum tube 27 of a tuned plate tuned grid oscillator.

During normal operation of the textile machine the grid circuit is out of tune with the plate circuit so that substantial current flows in the plate circuit. When the metallic core is moved into closer proximity to one of the coils 22 the frequency of the pair of coils 22 is changed so as to coincide with the frequency of the plate circuit so that the oscillator is now in tune and the current drops in the plate circuit so that a normally closed relay 28 is opened to actuate a control circuit described below.

The relay 28 operates to momentarily close a switch 29 to place the relay coil 30 across the line. The relay coil 30 closes the locking contacts 31 and closes the contacts 32 to place the signal light 33 across the line and opens the contacts 34 to stop the motor which supplies power to the machine. A reset switch 35 is provided to de-energize the relay 30 to open the contacts 31 and 32 and close the contacts 34 to again energize the motor supplying power to the roving frame when the faulty end has been put back up. The switch 29 has already been opened by relay 28 due to re-energization of relay 28. The signal light 33 is thus energized until a faulty roving condition is corrected and the reset switch 35 actuated to again energize the motor operating the roving frame.

FIGURES 4 and 5 show a stop motion for a roving frame and the like in which a coil H is moved responsive to movement of the drop wire into inductive relationship with one of a pair of coils I so as to induce electrical energy into one of the coils I which may be amplified and used to control means for shutting off power to the textile machinery upon the occurrence of a faulty textile strand.

The mounting strip E formed of insulating material is shown suitably positioned upon the roving frame B and carries four bus bars 41, 42, 43 and 44 imbedded therein each having one exposed side. The wire shank 45 carries the usual eye 46 to accommodate the roving. The wire 45 passes through a transverse bore 47 in a shaft 48 which is journaled within the casing broadly designated at 49. A set screw 50 secures the drop wire within the bore 47 within the sleeve or shaft 48. An energized coil 51 depends from the shaft 48 by a wire 52 which is fixed within a transverse bore 53 by the set screw 54. The coil 51 depends from a mounting strip 55 which is carried by the wire 52 and serves as a contact strip for connecting respective ends of the coil 51 to the bus bars 41 and 42. A pair of coils 56 are positioned adjacent opposite sides of the coil 51 and each end of these coils has electrical connection with the bus bars 43 and 44, respectively.

An oscillator energizes each of the coils 51 through bus bars 41 and 42 so that when a drop wire F tilts to one side or the other electrical energy will be induced from the coil 51 into one of the coils 56. The high potential side of the coil 56 is connected electrically to the bus bar 43 which has suitable electrical connection with the grid of an amplifier tube 57. The plate current from the amplifier tube 57 is then rectified by a tube 58 which is polarized to provide an output which overrides a negative bias placed upon the control grid of a relay tube 59 by the power supply. Increased current will now flow in the plate circuit of the relay tube so as to actuate a relay for operating a control circuit similar to that described above for energizing a signal light and opening the contacts of the motor supplying power to the textile machine.

FIGURES 6 and 7 show a stop motion for a roving frame in which drop wires F carry means in the form of a permanent magnet for generating electrical energy in a stationary coil I. The output of the coil I is then amplified to operate means for shutting off the power to the roving frame and the like.

A mounting strip E formed of insulating material is shown mounted on the roving frame B so that the drop wires F are each in operative position with respect to a roving S. The drop wire F has the usual wire 60 which carries an eye 61 to accommodate the roving on one end while the wire shank 60 is carried within the transverse bore 62 within a shaft 63. The shaft 63 is rotatably mounted in the bushing 64 carried by the roving frame B. The drop wire is fixed within the bore by the set screw 65. A permanent magnet 66 which should be of relatively light construction is shown positioned on the wire 60 between the eye 61 and the shaft 63. If desired the wire itself could be made into a permanent magnet. A coil 67 is shown mounted on a suitable bracket 68 having connection with the roving frame. The coils 67 may be mounted in any suitable way but it is desirable that they be spaced between the drop wires so that any one coil may be operated from either drop wire positioned next adjacent thereto. It will be noted that one end of each coil is connected to one of the bus bars 69 while the other is connected to the bus bar 70 imbedded within the mounting strip E. The bus bar 69 which is connected to the high potential side of the coil has electrical connection with the control grid of an amplifier tube 71 the output of which is supplied to a second amplifier tube 72. The output of the amplifier tube 72 is rectified by the tube 73 which is so polarized that the output therefrom overrides the negative bias normally on the control grid of a relay tube 74.

When an end comes down an appreciable amount of current flows through the relay tube by virtue of the fact that the negative bas is overridden by the amplified output of the coils 67 so that a relay is energized to operate a control circuit similar to that described above for lighting a signal lamp and de-energizing the motor supplying power for the machine.

FIGURES 8 and 9 show a mounting strip E which is also constructed of insulating material and which carries four bus bars 80, 81, 82 and 83. The drop wire F includes the usual eye 84 and wire shank 85. The wire shank is fixed within a transverse bore 86 carried within a shaft 87 by a set screw 88. The shaft 87 is journaled within a casing broadly designated at 89. A longitudinally disposed contact element is suitably fixed on the shaft 87 and is normally spaced slightly above a resistance element 91 which is provided with a suitable mounting 92 within the casing 89. The resistance element 92 is of such a type that its resistance varies as its physical contours vary. This is the type resistance element which is normally referred to as a strain gauge.

A group of four of these resistance elements 91 forms a Wheatstone bridge. Each of the resistance elements 91 of the Wheatstone bridge are normally of the same rating so that the Wheatstone bridge is "balanced" so that the output from the Wheatstone bridge is negligible. When the rating of one of the resistance elements 91 is changed, unbalancing the circuit, due to the drop wire F moving the contact element 90 into engagement therewith so as to change its physical contours a useable output is delivered from the Wheatstone bridge. A suitable oscillator energizes two of the bus bars 80 and 82 which are connected to the other two bus bars 81 and 83 through the Wheatstone bridge. One of the bus bars on the output side of the Wheatstone bridge is connected to the control grid of an amplifier tube 93 while the other bus bar on the output side is suitably grounded. The amplifier output from the plate of the tube 93 is placed upon the control grid of a second amplifier control grid 94. The plate circuit current from the tube 94 is then rectified by the tube 95 which is so polarized that the output thereof is placed upon the control grid of a relay tube 96 so as to override a negative bias allowing

sufficient current to flow through the relay tube 96 to operate a relay for operating a control circuit similar to that described above for lighting the signal light and for shutting off power to the motor of the machine.

The foregoing disclosure and description of the invention is illustrative and explanatory thereof and changes and variations will occur of those skilled in the art which may be made within the scope of the appended claims without departing from the spirit of the invention.

What is claimed is:

1. In a stop motion for a roving frame and the like, the combination with a drop wire pivoted adjacent one end and supported by a roving adjacent its other end of a sensing circuit including, means establishing a magnetic field adjacent said drop wire in said sensing circuit and positioned adjacent the drop wire, means moved by the drop wire interrupting said magnetic field when the drop wire pivots resulting from a broken or excessively slack roving, electronic means detecting said interruption of said magnetic field, and electrically operable means actuated by said means detecting said interruption for stopping the roving frame.

2. In a stop motion for a roving frame and the like, the combination with an elongated drop wire pivoted adjacent one end and supported by a roving adjacent its other end of a sensing circuit including, a variable resistance element positioned adjacent the drop wire in said sensing circuit, means moved by said drop wire varying the resistance of said element when the drop wire pivots resulting from a broken or excessively slack roving thus varying the output of said resistance element, and electronic means operated by said output to stop the roving frame when the roving breaks or becomes excessively slack.

3. In a stop motion for a roving frame and the like, the combination with a plurality of drop wires pivoted adjacent their lower ends and each being supported by a roving adjacent their upper ends of a sensing circuit including, electrical elements in said sensing circuit each positioned adjacent respective drop wires, means moved in an arcuate path by said drop wires into operative relation with respective electrical elements varying the characteristics of one of the electrical elements when a drop wire falls due to a broken or excessively slack roving, means shutting off the power to said roving frame, and electronic means controlled by the output of said electrical element actuating said means shutting off the power to said roving frame when a roving breaks or becomes excessively slack.

4. The combination set forth in claim 3, in which said electrical elements are coils, and in which said means moved by said drop wires are metallic elements.

5. The combination set forth in claim 3, in which said electrical elements are coils, and in which said means moved by said drop wires are energized coils.

6. The combination set forth in claim 3, in which said electrical elements are coils, and in which said means moved by said drop wires are permanent magnets.

7. The combination set forth in claim 3, in which said electrical elements are flexible resistance elements the resistance of which change when their physical contours change, and in which said means moved by said drop wires are elements for exerting pressure against said resistance elements for changing their physical contours.

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